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Brief Report

COVID-Care: Rapid Expansion of an Existing Telestroke Infrastructure to Battle a Pandemic -

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The application of telemedicine-based approaches to emergency stroke care has been successfully employed for more than two decades [1]. Telestroke relies on high-quality videoconferencing capabilities, which allow for a stroke specialist to remotely evaluate patients seeking emergent stroke care [2]. Prior to the outbreak of the 2019 novel Coronavirus Disease (COVID-19), the widespread success of the telestroke model had resulted in its extension to other areas of medicine, for the purposes of expanding access to care. Now, in the midst of the current COVID-19 outbreak, caused by the highly contagious and rapidly spread Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), [3] the preexisting foundations of telestroke care offer enormous potential for augmenting clinical care of patients with the suspected respiratory illness while minimizing risks of exposure.

TRANSITIONS IN A STROKE CARE MODEL AT COMPREHENSIVE STROKE CENTERS

In order to provide timely care to stroke patients presenting to the Emergency Department (ED) of a Comprehensive Stroke Center (CSC), multiple stroke team members from a variety of disciplines often converge as a large group to emergently evaluate patients with syndromes concerning for acute stroke and limited ancillary information regarding patient history and exposures. During the present time of the COVID-19 outbreak, this common clinical situation therefore potentially poses risk for the unintentional simultaneous exposure of multiple healthcare providers working on the front-line. To mitigate this risk, the use of a telestroke platform can provide safe and effective triage and care of patients, even in a CSC ED. This approach reduces the number of bedside contacts needed to evaluate a suspected or COVID-positive patient, and additionally limits the use of Personal Protective Equipment (PPE) that is in short supply.

As an example of practical application of telestroke in a CSC ED, at Houston Methodist Hospital (HMH), we fully transitioned to telestroke as of April 1, 2020 in order to ensure timely and safe care to patients presenting with acute stroke syndromes. In Table 1, raw data for times to initiation of thrombolytic therapy are shown for January through April 2020 at HMH. The first suspected cases of COVID were seen in March 2020. Median times to thrombolytic treatment increased from 45 minutes to 67.5 minutes, largely due to delays related to obtaining PPE and complying with necessary new protocols for infection control. Following the implementation of telestroke evaluations on April 1, 2020, the median time returned to the previous baseline of 45 minutes. At HMH, telestroke evaluations have been an effective measure to ensuring our patients continue to

get the appropriate care despite heightened precautions and inherent delays related to infection control, in keeping with the emergency guidelines recently published in Stroke [4] and supported by the American Heart Association/American Stroke Association.

OTHER USES OF A TELESTROKE INFRASTRUCTURE

The principles of telestroke can be utilized in other areas of inpatient care for the purposes of reducing/conserving PPE and minimizing patient exposure to avoid nosocomial spread [5]. The classic model for inpatient rounding in an academic setting, an attending leading a team of trainees through the hospital for bedside teaching, presents challenges in the time of a pandemic. In a telemedicine model, “table rounds” can be done via a virtual meeting service with all members of the team, and physical rounds can then be limited to only 1 or 2 team members. A designated virtual visit phone or tablet can be utilized by the bedside nurse and exam maneuvers can be requested by a neurology team member observing from a safe distance. In the intensive care unit setting, as intensivists are being called to aid in the care of an increasing number of COVID patients, virtual ICU access is becoming necessary for acute management of both COVID and non-COVID patients. Patients can be rapidly assessed without the need for donning and doffing of precious PPE. Additionally, remote availability of critical care physicians can reduce the burden of already stretched thin on-site intensivists.

AMBULATORY VIRTUAL CARE

In the outpatient setting, virtual visits have seen an exponential growth at HMH. Beginning in March 2020, HMH increased the number of providers with virtual care capabilities from 66 providers on March 1 to over 900 providers by March 25. There were 59 virtual visits performed in total in March 2019, and that number surpassed 15,000 in March 2020.

Patients with symptoms concerning for COVID can be assessed for recommendations by their Primary Care Physician (PCP) without leaving their homes, and thus reducing the risk of spread within the community [6]. Routine specialty care visits have also rapidly been converted to virtual visits (either phone or video-based) in an effort to keep patients, physicians, and staff safe through social distancing measures. While this can be challenging in a field like neurology, which is largely dependent upon a thorough physical exam, a wide array of resources have become readily available through professional societies, like the American Academy of Neurology, to assist in adapting ones practice to telemedicine [7]. Despite the challenges, the neurology group at HMH went from a combined total number of 41 video visits in January and February 2020, to over 1000 video visits in March 2020.

TELEMEDICINE IN ACADEMICS

New and innovative methods of teaching and continuing educational activities in residency programs and medical schools are also a necessity during this pandemic. Gone are the days of packing residents and students into close quarters for educational conferences. At our institutions, as certainly many others around the country have done, lectures and conferences are now held via videoconference. Furthermore, trainees can continue to participate in outpatient clinics by performing virtual visits and

Table 1: Time to thrombolytic therapy at HMH in 2020.

Door to Needle (DTN)			
Month	Avg (min)	Median (min)	# of patients
January 2020	50.9	45	n = 14
February 2020	42.3	43.5	n = 14
March 2020*	63	67.5	n = 8
April 2020**	57.6	45	n = 7

*First suspected cases of COVID in Houston, TX, USA
 **Implementation of a telestroke-based evaluation for all suspected acute strokes.



consultations with the supervision of an attending via the platforms mentioned above. This incorporation of telemedicine into trainee outpatient clinical activities will certainly offer an invaluable educational exposure to a technology that is likely to be increasingly relied upon in the future growing world of telemedicine.

Coordination of efforts to transition care to telemedicine requires adequate ancillary staffing to make the transition as smooth as possible. This often requires department-wide or system-wide meetings to communicate up to date information and instructions. Virtual platforms traditionally used for clinical care have become multipurpose during this time of social distancing, and are a necessity for broad communication among staff without face-to-face meetings.

CHALLENGES IN IMPLEMENTATION AND USE OF TELEMEDICINE

With the growing utilization of telemedicine for patient care in the current setting of the COVID-19 outbreak, important considerations regarding the financial and legislative implications of shifting to telemedicine-based care are important to discuss. Despite the successes of acute telestroke as an integral part of the stroke system of care, even the most robust programs have been faced with a number of challenges. Most commonly, difficulties persist with credentialing, interstate licensure and credentialing, and legal ramifications when providing clinical care [8]. Fortunately, in recent years, state and federal regulations have allowed for greater ease in adopting the use of telemedicine for a myriad of clinical and non-clinical services.

Reimbursement has remained the major challenge in keeping many programs afloat. The regulatory requirements that must be met to allow for true parity in reimbursement of a telemedicine visit with an in-person visit have also been temporarily relaxed. Originating sites within defined rural areas, and specific facility requirements, were a major hindrance to the potential use of telemedicine. During the COVID-19 outbreak, federal and state based support for increased expansion of utilization and reimbursement for telehealth services has led to a dramatic shift in the healthcare paradigm. The Centers for Disease Control and Prevention, along with many other public health organizations, put out tip sheets in preparing clinical care sites with telemedicine during COVID-19 [9]. In early March 2020, the Coronavirus Preparedness and Response Supplemental Appropriations Act was signed into law, which included emergency funding for federal agencies and the authority for Health and Human Services to temporarily expand reimbursement for telehealth services [10]. Certainly, government funded managed care plans were the first to adopt the payer legislation, however many states additionally adopted mandates for private payer reimbursement for telemedicine services [11].

FINAL THOUGHTS

On a broader plane, the current COVID-19 outbreak has resulted in a dramatic shift in the reliance on telemedicine for inpatient and outpatient care and resident education that has galvanized the rapid expansion and innovative use of telehealth services on a global scale. Building upon an existing infrastructure of telestroke, many health systems were able to not only continue, but also augment care during the global health crisis. Minimizing exposure while simultaneously conserving PPE were the primary drivers of the

movement, however other less clinical aspects of healthcare also became a token for its use. We are hopeful to see a post-pandemic paradigm shift towards virtual technology to accomplish day-to-day tasks not only in medicine, but in many other disciplines as well. Collectively, having realized the potential that technology can offer in a time of crisis, we expect that this historical juncture has set the stage for a new normal that will persist beyond the current pandemic.

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Appendix		
Name	Location	Contribution
Jillian Heisler MD, Ph D	Houston Methodist Hospital	Conceptualized the study; conducted literature review; interpreted data; drafted and revised the manuscript for intellectual content
Mark R Etherton MD, PhD	Massachusetts General Hospital	Conceptualized the study; conducted literature review; interpreted data; drafted and revised the manuscript for intellectual content
Anand Viswanathan MD, Ph D	Massachusetts General Hospital	Conducted literature review; drafted and revised the manuscript for intellectual content
Lee Schwamm MD	Massachusetts General Hospital	Conducted literature review; drafted and revised the manuscript for intellectual content
Rajan R Gadhia MD	Houston Methodist Hospital	Conceptualized the study; conducted literature review; interpreted data; drafted and revised the manuscript for intellectual content